

IPRL Offshoots

USDA-ARS Invasive Plant Research Laboratory
3205 College Ave., Fort Lauderdale, FL 33314



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If you're not familiar with the threat of *Melaleuca quinquenervia* then you need to read this report.

Melaleuca is so aggressive that when it spreads to new lands, the dense trees crowd out most, if not all, other plants. This in turn makes the land uninhabitable for most animals, thereby changing the whole ecosystem of an area.

The logo at left is the symbol for the TAME Melaleuca project, the subject of this report's feature article. One of TAME's main goals is to inform the public of ways to control and prevent the spread of this highly invasive plant.

John Scoles - Editor

Upcoming Events

Plant Biologists of South Florida Meeting

April 3, 2004

Big Cypress National Preserve, Florida

<http://pbsf.org>

65th Annual Meeting of the Association of Southeastern Biologists

April 14-17, 2004

University of Memphis, Fogelman Executive Center
Memphis, Tennessee

www.people.memphis.edu/~biology/asb/

TAME Melaleuca Project

Melaleuca (MEL-ah-LUKE-ah) represents one of the largest threats to biodiversity: the spread of non-native plants into natural areas. Fourteen years ago the South Florida Water Management District and other members of the Florida Exotic Pest Plant Council began a battle to remove melaleuca populations in South Florida. Their weapons were mechanical, chemical, and cultural controls, and they detailed their tactics in the Melaleuca Management Plan. As a result, melaleuca acreage on public lands has noticeably decreased, although it is still spreading on private property.

In 2001 the USDA's Agricultural Research Service (ARS) created the TAME Melaleuca project to further promote melaleuca control on public and private lands, and to show the usefulness of biological control in management strategies. The goal of this project is to develop a sustainable and integrated melaleuca control program through partnerships with federal, state, local, and private land managers for the long-term control of this invasive weed.

More upcoming events on page 9

Melaleuca Quick Fact:

Melaleuca quickly forms dense, impenetrable stands of tall trees (to 100 feet) that completely shade out and displace native vegetation.

Specific objectives of TAME Melaleuca include:

- Show the impact of integrated management strategies and control tactics,
- Assess melaleuca's current geographic dispersal,
- Measure the sociological and economic factors influencing adoption of control tactics,
- Carry out supporting research; and
- Transfer information to land managers about integrated control methods for melaleuca.

History

First brought to Florida from Australia around 1900, melaleuca

dry up the Everglades. However, as is often the case when plants escape beyond their natural range without the associated enemies (such as insects and viruses) that control their population, the tree soon became a nuisance. Melaleuca faced little opposition and quickly spread beyond the areas where it was purposely planted. It was first reported in Everglades National Park in 1967.

By 1993 it covered as much as 488,000 acres in South Florida. Eventually, melaleuca occupied up to 20 percent of all natural land south of Lake Okeechobee.

The most noticeable feature of melaleuca is its pale, papery bark that peels easily, giving the tree its common name in Australia, the paperbark tree. This tree averages 50 to 70 feet in height and retains its leaves all year. It can flower several times each year with white flowers that look like bottlebrushes. Seeds grow within woody capsules that cluster on the stems. In wetland areas, such as the Everglades, melaleuca forms dense stands of thin trees. One acre can contain as many as 132,000 melaleuca saplings and trees.

What is Bad about Melaleuca

Melaleuca invades treeless sawgrass marshes and other plant communities, winning out over native plants. It gradually forms

First brought to Florida from Australia around 1900 by horticulturalists, melaleuca found widespread use as an ornamental tree.



Melaleuca flowers.

Photo by Dr. Paul Pratt

found widespread use as a decorative tree and as a soil stabilizer on levees and spoil islands. It was even used in early attempts to

an ecological wasteland where little else exists but the trees. The ruined habitat resulting from invading melaleuca affects wildlife across Florida south of Orlando, including endangered species such as the Cape Sable seaside sparrow, the wood stork, the red-cockaded woodpecker, and the Florida panther. Also, South Florida is important to millions of migrating birds. Every spring and fall the birds migrate to and from the Caribbean and Central America to breed in North America and stop in Florida along the way. Natural vegetation is crucial to them, as it provides the fruits, seeds, and insects needed to fuel their trip. Melaleuca forests may look completely natural, but their quality as a habitat may not be much better than that of a parking lot. And in development-driven South Florida, it is crucial to keep natural areas as unspoiled as possible if we want to maintain wildlife for future generations.

Melaleuca trees are fairly fragile with shallow root systems and thus are potential hazards during windstorms. However, the greatest threat to people living near melaleuca stands is fire. Because of high levels of oils in its leaves, melaleuca burns very hot and the fires are difficult to put out. Allowing melaleuca to grow near houses may increase the threat of fire to homes during dry periods. Not only does fire often not kill the trees, but fire also promotes their spread by causing seeds to release and creating ideal soil conditions for seedling growth.

Melaleuca grows in upland habitats as well as it does in wetlands. Because nothing grazes its leaves, it can become quite a nuisance in pastures. South Florida ranchers must keep their pastures mowed to suppress melaleuca seedlings.

In 1990 it became illegal to grow, sell, or transport melaleuca in Florida, and in 1993 it became illegal to possess in the state. In 1992 melaleuca was listed on the Federal Noxious Weed List.

Melaleuca Harbors another Invasive Pest

Besides being a noxious weed in its own right, melaleuca harbors lobate lac scale, an invasive insect. This tiny pest, first found in Florida in 1999 and native to India, attacks over 200 species of trees and shrubs in this state. The effects of this insect are potentially devastating to many ornamental and fruit-producing trees and to natural communities. Melaleuca trees act as a reservoir for this insect, allowing it to infest nearby trees.

Melaleuca Quick Fact:

Melaleuca can grow 3-6 feet per year and one tree can produce as many as 20 million seeds annually.



Lobate lac scale on a melaleuca branch.

Photo by Dr. Paul Pratt

Melaleuca Quick Fact:

Currently, melaleuca is found in 19 counties in southern Florida, the northernmost counties being Brevard, Orange and Hernando.



SCA intern Shannon Morath examines a flowering melaleuca tree

*Photo by
Scott Wiggers*

What Good is Melaleuca?

Melaleuca has two uses: a nectar source for bees and mulch. Melaleuca produces some of the most environmentally friendly and termite resistant mulch on the market. But producers have a difficult time convincing consumers to buy it because it is not the mulch to which they have grown accustomed. The majority of mulch comes from cypress; sadly, producers cut thousands of cypress trees each year solely for landscape mulch.

A market for melaleuca products would provide another incentive for melaleuca removal from natural lands. It is possible that mulching melaleuca could aid in spreading its seeds, so the Florida Department of Environmental Protection (FDEP) advises commercial producers to compost

melaleuca chips for 90 days to kill the seeds before bagging. Thus far, producers have been very cooperative and melaleuca mulch has not been the cause of extensive spreading of seeds. However, if seedlings appear, they can easily be pulled by hand.

Melaleuca can flower up to five times per year, and beekeepers use this trait to their advantage

to produce honey throughout the year. Originally unpopular because of its strong smell and taste, melaleuca honey finally found its niche in baked goods. However, honey bees may increase melaleuca seed production by causing higher pollination rates than native insects.

The Cost of Melaleuca

During the 1990s, agencies in Florida spent \$35 million to control this noxious weed. The FDEP has stated that melaleuca's uncontrolled spread would drastically restrict the use of parks and recreation areas. Estimates suggest that reduced ecotourism alone could result in the loss of \$168.6 million per year to Florida's economy. The good news is that something can be done. During the 1990s, land management agencies reduced melaleuca coverage on South Florida public lands by about 35 percent. The South Florida Water Management District estimates that control of melaleuca could occur within the Everglades Water Conservation areas and marshes of Lake Okeechobee by 2009.

The tree, however, continues to spread on private lands. As is the case with any invasive species, successful control of melaleuca requires using several tactics in an integrated approach. One of these tactics is the deliberate introduction of biological controls—natural enemies from the pest's home range. Already, two such insects, the melaleuca weevil and the melaleuca psyllid, have cleared rigorous screening trials and have been released across southern

Florida. As of fall 2003, the insects have established themselves across South Florida, and the results have been impressive.

Eliminating Melaleuca

Seeds produced by melaleuca trees grow in capsules along the branches. Any environmental stress, such as applying herbicides, cutting, or burning, causes the capsules to open and drop their seeds. A single mature tree can hold up to 100 million seeds. Attempts to control melaleuca must take into account the large number of seedlings that will appear within months after the seeds drop.

Once well-established, melaleuca is expensive and nearly impossible to wipe out. Land owners desiring to

protect Florida's natural areas from this threat should remove their melaleuca trees. The first step involves becoming more educated about this weed and other invasive pests. The second step is deciding how to manage existing trees. When cutting down a melaleuca tree, treat the remaining stump with a proper herbicide to prevent regrowth. Finally, you should dispose of any debris in such a way that melaleuca seeds will not find their way to new areas. Contact your local Cooperative Extension Office for details.

Melaleuca Quick Fact:

In the 1930's, melaleuca seeds were scattered by airplane over the Everglades in an effort to drain "useless swamps."

Undersecretary of Agriculture Visits the IPRL

Undersecretary of Agriculture Dr. Joseph Jen visited the IPRL on February 11, 2004. The purpose of his visit was to meet with the scientists and staff and tour the facilities. Dr. Jen was accompanied by Dr. Calvin Arnold. Dr. Arnold is the center director for the ARS laboratory in Fort Pierce, Florida.

Dr. Jen is a political appointee of the Bush administration and he gave the IPRL staff a brief overview of his career in agriculture. A former Dean of Agriculture at California Polytechnic State University in San Luis Obispo, California, Dr. Jen also spent many years in the business world as the Director of Research for the Campbell's Soup Company. Dr. Jen also spent

several years teaching at various universities.

Dr. Jen thanked the IPRL staff for their work on invasive plant research, especially during these troubled times in the war on terrorism. He met briefly with the IPRL scientists and was briefed on the status of current research programs. Dr. Jen was open to discussion on topics of concern to the scientists. After the meeting Dr. Ted Center, IPRL research leader, led Dr. Jen on a tour of the quarantine facility and research plots at the station.



Undersecretary of Agriculture Dr. Joseph Jen speaks to the IPRL staff.

Photo by John Scoles

Melaleuca Quick Fact:

Melaleuca was brought to Florida as an ornamental plant in the late 1800's.

Biological Control of Melaleuca

When melaleuca was introduced to Florida, the tree left its natural enemies behind (such as predators, parasites, and germs). As a result, the tree was freed from the controls that would limit its population. Since its arrival in the U.S. 100 years ago, melaleuca has covered hundreds of thousands of acres in South Florida.

A good method of striking back at an invasive species is to release its natural enemies where it is found outside its home range. This solution, known as biological control, does not stamp out the pest, but it decreases its numbers. Since the search for likely biological control agents



Adult melaleuca weevil
Oxyops vitiosa.

Photo by Dr. Paul Pratt.

began in 1986, researchers have studied over 450 would-be agents from Australia. Agents approved for release must feed only on melaleuca and not harm other plants or animals. For the

melaleuca problem in Florida, researchers wanted species that feed on new growth and reduce seed production. Two insects passed the tests and are now free to do their work.

State and federal agencies, including the South Florida Water Management District, Florida's Department of Environmental Protection, and the USDA's Agricultural Research Service worked together to release the two agents described here. While these helpful insects are now feeding on melaleuca trees across southern Florida, it may take several years for them to reach their full effect, and it may require added agents to keep melaleuca in check.

First released in April 1997, melaleuca weevils have been spread to over 150 places. Signs of their presence include holes or gouges in buds and leaves. Adults are fairly easy to spot. They are gray-brown, with six legs and a snout, and larger than a ladybug (up to 3/8 inch). Touch them and they tend to play dead and fall to the ground. Adult weevils may live longer than one year, and females may lay up to 1,000 eggs. Eggs hatch after seven days and spend seven weeks as larvae (young insects). Larvae grow up to 1/2 inch, are slug-like, and trail thin coils of waste matter. Larvae are usually gray but might appear yellow. When the larvae are ready to pupate, they cease feeding, crawl or drop to the

ground, and spend about four weeks underground in an earthen capsule. They emerge from the soil as adult weevils. Due to this time spent in the soil, weevils do not fare well in areas that are always flooded.

First released in April 2002, the melaleuca psyllid (SILL-id) is hard to see because of its small size (1/8 inch). However, its nymphs (young insects) are easy to detect by the waxy white fluff that they ooze onto melaleuca leaves and stems. (See the Picture of the Month on page 8.) This wax is harmless and washes off with rain. Psyllids complete their entire six-week life cycle on the melaleuca tree. Females lay pale to bright yellow eggs on leaves and

stems. The eggs hatch in about two weeks. Nymphs take around three weeks to grow into adults. Nymphs cause most of the feeding damage.

Both the weevil and the psyllid attack only the melaleuca tree. Because they prefer to eat new growth, they are most active from late fall through spring, when melaleuca grows most quickly in Florida. Psyllids also feed on mature leaves, causing the leaves to discolor and drop. While they have not been observed killing mature trees, these agents can destroy melaleuca seedlings and saplings. The effects of biological control agents on melaleuca trees include defoliation, stunted growth, reduced flower and seed production, and a brownish and usually unhealthy look. Research has shown that the weevil can cause up to an 80% decline in flowering. Over time, this flower damage will reduce the spread of melaleuca and the costs related to controlling it. Biological control agents are believed to be the best method for long-term control of such widespread invasive weeds, and they are a key part of efforts to restore at-risk ecosystems such as the Everglades.

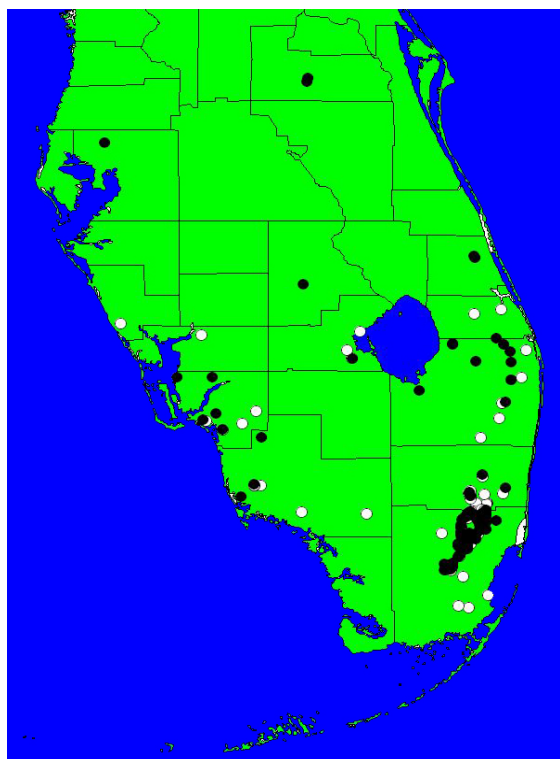


New growth on melaleuca. Note the damage caused by weevils on older leaves.

Photo by Dr. Paul Pratt

Melaleuca Quick Fact:

Melaleuca has become abundant in wet pine flatwoods, sawgrass marshes and praries, and cypress swamps.



Biological control agent distribution in south Florida. Black circles are psyllids, white circles are weevils.

Web Sites You May Want to Visit

To learn more about invasive plants and what various organizations are doing about them, visit the following sites on the internet.

Agricultural Research Service
www.ars.usda.gov/

Center for Exotic and Invasive Plants
plants.ifas.ufl.edu

Federal Noxious Weed Program
www.aphis.usda.gov/ppq/weeds

Florida Department of Agriculture,
Department of Plant Industry
www.doacs.state.fl.us/~pi/index.html

Florida Department of Environmental Protection,
Bureau of Invasive Plant Management
www.dep.state.fl.us/lands/invaspec/

Florida Exotic Pest Plant Council
www.fleppc.org

Invasive Plant Research Laboratory
www.weedbiocontrol.org/

The National Agricultural Library's Invasive
Species website
www.invasivespecies.gov

National Noxious Weed Program
<http://dogwood.itc.nrcs.usda.gov/weeds>

South Florida Water Management District
www.sfwmd.gov

Southwest Florida Water Management District
www.swfwmd.state.fl.us/

TAME Melaleuca Project
<http://tame.ifas.ufl.edu>

The Nature Conservancy
<http://nature.org/>



Picture of the Month

Melaleuca psyllid nymphs. The white threads are flocculence secreted by the insect. Photo by Susan Wineriter, USDA-ARS, Gainesville, Florida.

The IPRL Says Farewell to Julia Cherry and Hello to Shannon Morath.

Using students at research facilities is a common practice. It is a win-win proposition: the students get badly needed practical experience and the research facility gets much-needed help with field work and lab work. There are currently seven interns, two student employees and one graduate student working at the IPRL. The interns come to the IPRL in cooperation with the Student Conservation Association (SCA) and the student employees are here as part of the Student Temporary Employment Program (STEP).

Julia Cherry was here for three months in 2003. She is a doctoral candidate in biology at the University of Alabama. Her stint with the IPRL was in cooperation with the National Science Foundation's IGERT (Interactive Graduate Education and Research Training) program and the Fresh Water Sciences program at the University of Alabama. While at the IPRL, Julia worked on the water hyacinth project with Dr. Ted Center. Julia's goal is to complete her doctorate degree then teach at a small liberal arts college. She completed her term at the IPRL in early December. We thank her for her hard work and dedication and wish her the best of luck in her endeavors.

Shannon Morath arrived the first week of December to serve a one year term as an intern. She is a graduate of New York University with a degree in French and English and wishes to broaden her horizon with a shift to scientific work. Shannon will be working on the TAME Melaleuca project with Dr. Paul Pratt.

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More upcoming events

Florida Exotic Pest Plant Council
20th Annual Symposium and
Southeast Exotic Pest Plant
Council 6th Annual Symposium
April 28-30, 2004
Clarion Suites and Convention
Center
Pensacola Beach, Florida

www.fleppc.org/

Aquatic Weed Control Short
Course 2004
May 3-7, 2004
Ft. Lauderdale, Florida
<http://conference.ifas.ufl.edu/aw/>

2nd Latin-American Short Course
on Biological Control Weeds
June 7-10, 2004
Barcelo Hotel
Montelimar, Nicaragua

44th Annual Meeting of the Aquatic
Plant Management Society
July 11-14, 2004
Tampa, Florida
www.apms.org

89th Annual Meeting of the
Ecological Society of America
August 1-6, 2004
Portland, Oregon
www.esa.org/portland/



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